

CLAIMS

What is claimed is:

1 1. A protective structure for blocking the propagation of defects generated in
2 a semiconductor device, the structure comprising:

3 a deep trench isolation formed between a memory storage region of the
4 semiconductor device and a logic circuit region of the semiconductor device, said deep
5 trench isolation being filled with an insulative material;

6 wherein said deep trench isolation prevents the propagation of crystal
7 defects generated in said logic circuit region from propagating into said memory storage
8 region.

1 2. The structure of claim 1, wherein said deep trench isolation is formed
2 beneath a shallow trench isolation, said shallow trench isolation for electrically isolating
3 devices contained in said memory storage region from devices contained in said logic
4 circuit region.

1 3. The structure of claim 1, further comprising a plurality of deep trench
2 isolations surrounding said memory storage region.

1 4. The structure of claim 3, wherein said plurality of deep trench isolations
2 further comprise:

3 an inner perimeter and an outer perimeter, wherein individual deep trench
4 isolations included in said outer perimeter are disposed adjacent to gaps in between
5 individual deep trench isolations included in said inner perimeter.

1 5. The structure of claim 1, wherein said memory storage region comprises a
2 DRAM array region.

1 6. The structure of claim 5, wherein said DRAM array region includes a
2 plurality of deep trench storage capacitors.

1 7. The structure of claim 6, wherein said logic circuit region further includes:
2 a plurality of CMOS devices; and
3 a high dose impurity layer implanted within a substrate of said logic circuit
4 region, said high dose impurity layer used to inhibit parasitic bipolar transistor action
5 between said plurality of CMOS devices.

1 8. An embedded DRAM (eDRAM) device, comprising:
2 a logic circuit region;
3 a memory storage region embedded within said logic circuit region;
4 a shallow trench isolation for electrically insulating devices included
5 within said memory storage region from devices included within said logic circuit region;
6 and
7 a deep trench isolation, formed underneath said shallow trench isolation,
8 said deep trench isolation for preventing the propagation of crystal defects generated in
9 said logic circuit region from propagating into said memory storage region.

1 9. The eDRAM device of claim 8, wherein said shallow trench isolation
2 surrounds said memory storage region.

1 10. The eDRAM device of claim 9, further comprising a plurality of deep
2 trench isolations surrounding said memory storage region.

1 11. The eDRAM device of claim 10, wherein said plurality of deep trench
2 isolations further comprise:
3 an inner perimeter and an outer perimeter, wherein individual deep trench
4 isolations included in said outer perimeter are disposed adjacent to gaps in between
5 individual deep trench isolations included in said inner perimeter.

1 12. The eDRAM device of claim 11, wherein said memory storage region
2 includes a plurality of deep trench storage capacitors.

1 13. The eDRAM device of claim 12, wherein said logic circuit region further
2 includes:
3 a plurality of CMOS devices; and
4 a high dose impurity layer implanted within a substrate of said logic circuit
5 region, said high dose impurity layer used to inhibit parasitic bipolar transistor action
6 between said plurality of CMOS devices.

1 14. A method for blocking the propagation of defects generated in a
2 semiconductor device, the method comprising:
3 forming a deep trench isolation formed between a memory storage region
4 of the semiconductor device and a logic circuit region of the semiconductor device; said
5 deep trench isolation being filled with an insulative material;
6 wherein said deep trench isolation prevents the propagation of crystal
7 defects generated in said logic circuit region from propagating into said memory storage
8 region.

1 15. The method of claim 14, wherein said deep trench isolation is formed
2 beneath a shallow trench isolation, said shallow trench isolation for electrically isolating
3 devices contained in said memory storage region from devices contained in said logic
4 circuit region.

1 16. The method of claim 14, further comprising forming a plurality of deep
2 trench isolations to surround said memory storage region.

1 17. The method of claim 16, further comprising:
2 configuring said deep trench isolations to form an inner perimeter and an
3 outer perimeter, wherein individual deep trench isolations included in said outer
4 perimeter are disposed adjacent to gaps in between individual deep trench isolations
5 included in said inner perimeter.

1 18. The method of claim 14, wherein said memory storage region comprises a
2 DRAM array region.

1 19. The method of claim 18, wherein said DRAM array region includes a
2 plurality of deep trench storage capacitors.

1 20. The method of claim 19, wherein said logic circuit region further includes:
2 a plurality of CMOS devices; and
3 a high dose impurity layer implanted within a substrate of said logic circuit
4 region, said high dose impurity layer used to inhibit parasitic bipolar transistor action
5 between said plurality of CMOS devices.